

AN  
ELEMENTARY DESCRIPTION  
OF THE  
ANATOMY AND PHYSIOLOGY  
OF THE  
Brain, Viscera of the Thorax, Abdomen, &c.  
WITH CORRESPONDING QUESTIONS.

DESIGNED FOR  
THE USE OF GENTLEMEN PREPARING FOR EXAMINATION  
AT APOTHECARIES' HALL,  
AND FOR JUNIOR STUDENTS.

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# PREFACE.

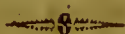


THE anatomical part of the examination at Apothecaries' Hall is limited to the internal parts ; as a distinction has obtained in the medical profession, that the province of the physician and apothecary should be confined to internal diseases ; while that of the surgeon should comprehend those which are external. The design of this little book is to facilitate the acquirement of a knowledge of those parts which are considered necessary to be known by the examiners at Apothecaries' Hall.—To accomplish this object, the author has thought it necessary to make the descriptions strictly elementary, and to arrange them so as to correspond with a series of questions subjoined. This method will afford the student a facility in self-examination, by a reference to the questions ; while the text will present him with a concise view of the parts necessary for him to learn. In the physiological division, a short account is given of the functions of the parts described.

While it is trusted that this arrangement will prove acceptable to the student preparing for ex-

amination, the author believes, that it will be found useful to the junior student: for he still has in remembrance the difficulties which he had to encounter in beginning to study the science of medicine, from the want of an elementary knowledge of the anatomy and physiology of the viscera. In the systematic works, he found such elaborate and minute descriptions mixed up with the history of contending opinions, on the structure and physiology of parts, as in a great measure to deter him from the pursuit. Whatever may be the pleasure and instruction to be derived from these works by the advanced student in anatomy, they serve but to confound and perplex him who is about to commence, and cause him but too frequently to turn from the study with dislike. Although it cannot be expected, that the junior student will make any considerable progress in anatomy till he has seen the parts demonstrated; still, he may here derive such a knowledge of the internal parts as will facilitate his progress in his medical studies. Trusting that the arrangement of this book will be found useful, the author submits it, without further remark, to those for whom it is intended, who are best able to judge of its merits.

# ANATOMY.



## THE BRAIN.

1. The brain is a large mass of soft matter, situated in the cranium.

2. It is enveloped by *three* membranes: most externally, the *dura mater*; under that, the *tunica arachnoides*; and, in contact with the brain, the *pia mater*.

3. The *dura mater* is composed of two layers of membrane.

4. The inner layer forms several duplicatures; the principal of which are, the *falx* major running between the two hemispheres; the *tentorium* between the *cerebrum* and *cerebellum*; and the *falx* minor dividing the *cerebellum* into two lobes.

5. Where the inner layer of the *dura mater* separates from the outer to form the several duplicatures, a triangular space is left, which is called a *sinus*.

6. Of these there are *four* principal—the *superior longitudinal*; the *two lateral*; and the *torcular Herophiti*.

7. The *superior longitudinal sinus* runs from the fore to the back part of the brain, at the upper part of the *falx* major; and it terminates by dividing into the *two lateral sinuses*.

8. The *lateral sinuses* are formed by the inner layer of the *dura mater* splitting from the outer, at the back part of the cranium to form the *tentorium*: they run forwards and downwards, and terminate in the internal jugular vein of either side.

9. The *torcular Herophili* runs between the falx major and tentorium, and terminates at the place where the superior longitudinal divides into the two lateral sinuses.

10. The *tunica arachnoides* is a very delicate membrane; and, like the dura mater, completely envelopes the brain.

11. The *pia mater* not only covers the brain, but dips down into all its convolutions, and serves as a medium for the ramification of arteries conveying blood to the brain and veins, returning it into the sinuses.

12. The substance of the brain is *cineritious*, or of an ash colour *externally*; but the *internal* and the greater part is *medullary*, or white.

13. The brain is generally divided by anatomists into *four* parts—*first*, the *cerebrum*; *second*, the *cerebellum*; *third*, the *pons Varolii*; *fourth*, the *medulla oblongata*.

14. The CEREBRUM is by far the largest portion; and it is divided *superiorly* by the falx major into two hemispheres; *inferiorly* into *six lobes*—two anterior, two middle, and two posterior.

15. The cerebrum is very much *convoluted*; and between its numerous convolutions the pia mater descends.

16. On separating the hemispheres, we observe a white body, called the *corpus callosum*, which joins the hemispheres.

17. Upon it there are two raised lines, with a sulcus between them which is called the *raphè*.

18. Upon cutting the hemispheres to a level with the corpus callosum, we observe a large portion of medullary matter, called the *centrum ovale*.

19. Under the centrum ovale are two large cavities, called the *lateral ventricles*.

20. These ventricles are separated from each other by a double membrane, called the *septum lucidum*.

21. Between the layers of the septum lucidum there is a cavity, which is called the *fifth ventricle*.

22. In the lateral ventricles we find on the fore part two large bodies of a cineritious structure, called the *corpora striata*; at the bottom, a triangular medullary body called the *fornix*; a collection of bloodvessels on each side, united together by a process of pia mater, called the *choroid plexuses*; two large medullary bodies, called the *thalamus inercorum*.

*opticorum* ; and between these and the *corpora striata* two small medullary bands, called the *tæniæ semicirculares*.

23. Each lateral ventricle has *three cornua*, or prolongations—the *anterior*, in which are placed the fore part of the *corpora striata* ; the *posterior*, in each of which there is an eminence, called the *hippocampus minor* ; and the *descending cornu* on each side, in which is the continuation of the *choroid plexuses* ; and an eminence, called the *hippocampus major*, portions of which receive the names of *tænia* and *pes hippocampi*.

24. The lateral ventricles communicate with each other by a fissure just below the fore part of the fornix, which is called the *foramen of Muuro*.

25. Under the fornix there is a process of pia mater, of a triangular figure, connecting the choroid plexuses, called the *velum interpositum*.

26. In front of the optic thalami there is a large opening, leading into the third ventricle, and communicating with the foramen of Muuro, called the *foramen commune anterius*.

27. Under the *velum interpositum* further back, there is an opening called the *foramen commune posterius*.

28: There is a small portion of cineritious matter between the optic thalami on the fore part, called the *commissura mollis* ; a medullary portion between the *corpora striata*, called the *commissura anterior* ; and, lastly, another medullary band, called the *commissura posterior*, uniting the optic thalami behind.

29. On separating the thalami nervorum opticorum from each other, we find a small triangular fissure, called the *third ventricle*.

30. From this ventricle there are *two passages* leading, one from the fore part to the infundibulum ; the other running backwards to the fourth ventricle.

31. Behind the lateral ventricles, and in front of the cerebellum, there are *four eminences*, called *corpora quadrigemina* ; but they are distinguished by the two superior and larger, being called *nates*, and the two inferior, *testes*.

32. Between the nates lies a small body, called the *pineal gland*, connected by its peduncles to the back part of the optic thalami.

33. The CEREBELLUM constitutes about one sixth part of the size of the whole brain. It is placed beneath the tentorium, which separates it from the posterior lobes of the cerebrum.

34. It is not convoluted, but formed of layers into the sulci, between which the pia mater descends.

35. It has *two lobes* partially separated by the falx minor.

36. On the upper surface there is a prominence, called the *processus vermiformis superior*; and one below, called the *processus vermiformis inferior*.

37. There is a thin process of brain, proceeding from the *testes* to the cerebellum, called the *velum interjectum*, forming the roof of the fourth ventricle.

38. On each side of the velum interjectum there is a white cord; and these are called the *processus a cerebello ad testes*.

39. On making a vertical incision of the cerebellum, a peculiar arrangement of medullary matter is perceived, called the *arbor vitæ*.

40. Having opened the cerebellum, a small cavity is seen, expanded in the middle, contracted before and behind, which is the *fourth ventricle*.

41. All the ventricles communicate with each other, except the *fifth*.

42. BASE OF THE BRAIN.—Here the division of the brain into *three lobes* on each side is seen.

43. The PONS VAROLII is a large eminence, situated at the base of the brain; it forms a communication between the cerebrum and cerebellum; it is formed by the union of *two* processes from each, called the *crura cerebri* and the *crura cerebelli*.

44. The MEDULLA OBLONGATA begins at the back part of the pons Varolii, and terminates in the medulla spinalis.

45. Upon the medulla oblongata there are four eminences; two placed most internally, called the *corpora pyramidalia*; and two more externally called the *corpora olivaria*.

46. There is a portion of cineritious matter uniting the crura cerebri, called the *pons Turrinii*.

47. Before the pons Turrinii are two small bodies, called the *corpora albicantia*.



48. Before the corpora albicantia there is a hollow bag, formed of cineritious matter, called the *infundibulum*, proceeding from the third ventricle to a small red body, called the pituitary gland.

49. The *tractus optici* is that part between the origins of the optic nerves and the point where they decussate, or unite.

50. BLOODVESSELS.—*Arteries*. The arteries which supply the brain, are the *internal carotid* of each side, and the *vertebral* of each side.

51. The *internal carotid* divides at the base of the brain into three branches: 1st, the *anterior*; 2nd, the *middle*; and 3rd, the *communicating branch*.

52. The two *anterior* are united at the commencement by a transverse branch; they then run downwards and turn up upon the *corpus callosum*.

53. Each *middle* artery runs outwards, in the *fissure of Sylvius*, between the anterior and middle lobes.

54. Each *communicating* artery runs backwards and unites with the *posterior cerebral*.

55. The *vertebral artery* of each side enters the skull through the foramen magnum; they run forwards till they reach the pons Varolii, where they unite and form one artery, called the *basilar*.

56. The *basilar artery* gives off several branches to the cerebrum and cerebellum; and having reached the fore part of the pons Varolii, it divides into the two *posterior cerebral* arteries.

57. There is a remarkable circle formed by the inosculation of the arteries at the base of the brain, called the *circle of Willis*.

58. The *circle of Willis* is formed on the fore part, by the *anterior cerebral* arteries, united by the transverse branch, the sides by the *communicating branches*, and the back part by the *posterior cerebral*.

59. Within this circle are found the *tractus optici* and union of the optic nerves, the *infundibulum*, the *corpora albicantia*, the *pons Varolii*, and portions of the *crura cerebelli*.

60. *Veins*.—The blood is returned from the brain by a great number of veins, which terminate in the sinuses; those from the upper and fore part of the brain in the *superior*

*longitudinal*, those from the middle in the *torcular Herophili*; those from the bottom part in various *smaller sinuses*, which, with the veins from the back part of the brain, the *superior longitudinal sinus* and *torcular Herophili*, terminate in the two *lateral sinuses*.

61. Thus the *lateral sinuses* return the blood from every part of the brain, and these empty it into the internal jugular vein of each side.

62. ORIGINS OF THE CEREBRAL NERVES.—The *first* pair arise from the fore part of the *corpora striata*, and are distributed on the pituitary membrane of the nose for the sense of smelling.

63. The *second* pair arise from the *thalami nervorum opticorum* and *inferior tubercula quadrigemina*, pass through the sclerotic coat of the eye, and form the retina for the sense of vision.

64. The *third* pair arise from the *crura cerebri*; and are distributed to all the muscles of the eye, except the abductor and superior oblique muscles.

65. The *fourth* pair arise from the *inferior corpora quadrigemina* and *velum interjectum*, and are distributed to the superior oblique muscles of the eyes.

66. The *fifth* pair arise from the *pons Varolii*, but chiefly from the *crura cerebelli*; the nerve on each side forms a ganglion, called the *Gasserian*, from which three branches are given off; the *first* to the appendages of the eye and forehead; the *second* to the upper jaw and face; and the *third* to the lower jaw and tongue.

67. The *sixth* pair arise *between* the *pons Varolii* and *corpora pyramidalia*, and supply the abductor oculi on each side.

68. The *seventh* pair consist of two portions—the *portio dura* and *portio mollis*; the *portio mollis* arises from the *bottom* of the *fourth ventricle*; the *portio dura* from the *medulla oblongata*: the first is distributed to the internal ear; the latter to the sides of the face.

69. The *eighth* pair are composed of two portions—the *glosso-pharyngeus* and *nervus vagus*; they arise from the *corpora olivaria*, and are distributed to the back part of the tongue, fauces, pharynx, œsophagus and stomach; also to the larynx trachea and lungs.

70. The *ninth* pair arise from the *corpora pyramidalia*, and are distributed to the muscles of the tongue.

## THE EYE.

71. The principal *appendages* of the eye are first, the *four recti* and *two oblique* muscles; next, the *palpebræ* or eyelids surrounded by some small glands and the *ciliæ* or eyelashes, which cover the fore part of the globe of the eye in sleep; then in the upper and outer part of the orbit is the *lacrymal gland*, for the secretion of tears; and at the back part, a quantity of fat and cellular membrane, upon which the globe of the eye rests.

72. At the inner angle of the eye there are two openings, called the *puncta lacrymalia*, which are for the transmission of the tears through the *lacrymal ducts* into a small bag at the inner angle, called the *lacrymal sac*; from this the nasal duct runs into the nose, forming a passage for the tears into the nose.—There is also a small red body, called the *caruncula lacrymalis*.

73. The first *coat* of the eye is common to it; and the eyelids being reflected from them, over the fore part of the globe of the eye, and is called the *tunica conjunctiva*—it is transparent where it covers the cornea.

74. The proper coats of the eye are, first, the *sclerotic*, of a firm structure, forming the back part of the globe; in front of this, we have a very small transparent coat, completing the globe in front, called the *cornea*.

75. The coat which lies on the inner side of the *sclerotic*, is of a dark colour, and very thin and vascular—it is called the *choroid*.

76. In front of the choroid there is a partial coat, called the *iris*; situated some way behind the cornea, in the middle of which there is a round hole, called the *pupil*.

77. Within the choroid coat the *retina* is situated, which is merely a pulpy expansion of the optic nerve.

78. It is sufficient here to say then, that the *coats* of the eye *behind*, which cover about four-fifths of the globe, are the *sclerotic*, the *choroid*, and the *retina*; that those in *front* are a common coat, called the *conjunctiva*, the *cornea*, and a partial coat called the *iris*.

79. There is a space extending from the back part of the cornea in front to the fore part of a body, called the lens behind; this is partially divided into unequal spaces by the iris, called the *anterior* and *posterior chambers*, of which the *anterior* is the largest.

80. The globe of the eye is occupied by two kinds of fluids—the smaller, called the *aqueous*; the larger, the *vitreous humour*.

81. The aqueous humour fills the *chambers*: the vitreous occupies all the back part of the globe behind the lens.

82. The *crystalline lens* is a somewhat firm body, of a double convex figure, resting on the fore part of the vitreous humour; in front it is slightly separated from the back part of the iris; and the space between them, around the edge of the lens, is occupied by a reflection of the choroid coat, called the *ciliary stricæ* and *processes*.

83. The eye is retained in the orbit by the *tunica conjunctiva*, the muscles and the optic nerve.

84. The *arteries* of the eye are derived from the *ophthalmic* artery, which is derived from the internal carotid, just before it perforates the *dura mater*.

85. This artery first sends a *branch* to the *lacrymal gland*; then *ciliary* arteries, which ramify in the choroid coat, and an artery called the *arteria centralis retinæ*, and *branches* to the *muscles*: in fact, it supplies the eye and all its appendages.

86. The *veins* correspond in their branches to those of the arteries, and empty themselves into the internal jugular.

87. The *nerves* are the optic for vision; and the muscles and appendages are supplied by the *third* pair, the *fourth* pair, the *ophthalmic branch* of the *fifth* pair, and the *sixth* pair.



## PARTS ABOUT THE FAUCES.

88. The bony palate is covered by the common membrane of the mouth; further back we perceive a duplication of this membrane, called the *soft palate*, which hangs floating into the back part of the mouth.

89. In the middle of the soft palate there is a small body, called the *uvula*.

90. Proceeding from the sides of the *velum pendulum palatum*, or soft palate, there are *two arches*, called the

*anterior* and *posterior* arches of the fauces ; these, like the velum, are mere duplicatures of the lining membrane of the month.

91. Between these arches there is a gland on each side, which are called the *tonsils*.

92. Between the fold forming the anterior arch some muscular fibres are placed, which are called the *constrictores isthmi faucium*, which close the opening of the month into the pharynx.

93. Between the fold forming the posterior arch there are also some muscular fibres, called the *palato-pharyngei* ; they carry the velum downwards and backwards ; their use is therefore to prevent the food from getting into the nares or Eustachian tube.

94. Behind these arches the pharynx is situated.

95. The pharynx is a large mucous bag, surrounded by muscular fibres, having *seven* openings into it—the largest one is from the mouth ; above the velum there are two from the nose ; near these one from the Eustachian tube of each side ; lastly, there are two inferiorly, one on the fore part leading into the larynx, and one behind into the œsophagus.

96. The space between the mouth and pharynx, and bounded on the sides by the arches, is called the *passage of the fauces* ; and it lubricated by a secretion from the tonsil and sublingual glands.

97. The *œsophagus* is a membranous and muscular tube, that begins from the termination of the pharynx, and passes down the neck through the posterior mediastinum and diaphragm to the stomach.

98. It has *three coats*—a *common* coat externally, chiefly composed of cellular membrane ; a *muscular* coat ; and a *mucous* or internal coat, which is merely a continuation of the lining membrane of the month.

99. The larynx is a cartilaginous cavity, situated behind the tongue, and is lined with a mucous membrane.

100. It is composed of five cartilages, connected to each other by a ligamentous membrane ; the *thyroid* cartilage is placed on the fore part and sides ; the *cricoid* beneath it ; the *two arytenoid* upon the back part of the cricoid and between the sides of the thyroid ; and, lastly, the *epiglottis*, which closes the opening of the

windpipe when any food passes into the pharynx.

101. The opening of the windpipe, or *rima glottidis*, is placed between the two arytenoid cartilages.

102. The *trachea* begins from the cricoid cartilage, and terminates where it is about to enter the lungs, in the *right* and *left bronchial tubes*.

103. It is composed of cartilaginous rings, deficient behind, connected together by a ligamentous substance; it is covered by loose cellular membrane; and it is lined by the mucous membrane, continued from the larynx.



### VISCERA OF THE THORAX.

104. The thorax is bounded above by the clavicle and first rib; below by the diaphragm; on the back part by the spine; on the sides by the ribs; and on the fore part by the sternum.

105. The contents of the thorax are the *lungs* and *heart*, with their investing membranes, and the *contents of the mediastina*.

106. There is a serous membrane called the *pleura*, which lines the ribs internally, where it is called *pleura costalis*; and it is reflected over the lungs, where it is called *pleura pulmonalis*.

107. LUNGS.—The lungs consist of a *right* and *left lung*; and each is contained in a distinct bag formed by the pleura.

108. These two bags, approaching each other in the middle of the chest, have a space left between them, called the *mediastinum*.

109. In the mediastinum we observe a bag, containing the heart, called the *pericardium*, but protruding into the left side.

110. The heart and the pericardium divide the mediastinum into two parts, which receive the names of the *anterior* and *posterior* mediastinum.

111. The lungs correspond to the thorax in shape—they are red in children, blue in the aged, and greyish in the adult.

112. The *right lung* is the largest, and is divided into *three lobes*—two greater ones and an intermediate one; the left lung has *two lobes*.

113. Into the grooves which separate the lungs into lobes the pleura enters.

114. That part of the lungs which is fixed to the spine is called the *root*, and here the great vessels enter.

115. The lungs are composed or made up of *arteries*, *veins*, *nerves*, *absorbents*, and *air cells* lined, by a continuation of the mucous membrane of the trachea, and a structure which connects all these together, called *parenchyma*.

116. The BLOODVESSELS of the lungs may be divided into *functional and nutrient*.

117. The *functional* are the *pulmonary artery* and *four pulmonary veins*.

118. The *pulmonary artery* arising from the right ventricle of the heart divides into a branch to each lung, and the ramifications form a network in the air cells of the lungs, and terminate in the commencement of the pulmonary veins.

119. The *pulmonary veins* unite into four trunks, *two* from each lung; which terminate in the left auricle of the heart.

120. The *nutrient* arteries of the lungs are derived from the descending thoracic aorta, and are called *bronchial*.

121. The *first* given off is called the *right bronchial*, which accompanies the ramifications of the right bronchial tube to the right lung.

122. The *second* is called the *left bronchial*, which supplies in like manner the left lung.

123. The *third* is called the *common bronchial*, which divides into *two*—one to the right and one to the left lung.

124. The *thoracic aorta* gives off some branches to the œsophagus.

125. And, lastly, it gives off *nine or ten intercostal arteries* on each side, which run along the under margin of each rib; supplying the *intercostal muscles*, *pleura*, and muscles on the sides of the chest; the two upper intercostal spaces are supplied by a branch from the subclavian on each side.

126. The blood is returned by veins corresponding to the branches of the arteries; the *right intercostal veins*,



the *lower left*, and those from the *right lung*, and great part of the *œsophagus*, terminate in the *vena azigos*.

127. The *upper left* intercostals, part of those from the *œsophagus*, and those from the *left lung* are received by a vein, called the *upper left intercostal*.

128. The *vena azigos* terminates in the superior *vena cava*; the *upper left intercostal* in the left subclavian.

129. The *nerves* of the thoracic and abdominal viscera, are derived from the *great sympathetic* and *par vagum*, assisted by branches from all the *spinal nerves*, and from all the *cerebral* after the *fourth pair*.

130. The *great sympathetic* is formed in the carotid canal, by a branch from the *fifth* and one from the *sixth pair* of *cerebral nerves*.

131. The nerve on each side descends on the sides of all the *vertebræ*; in the neck it forms *two ganglia*: in the thorax it forms *twelve ganglia*, one on the head of each rib.

132. All the *ganglia* communicate with each other, and with branches from the *spinal nerves*.\*

133. The *eighth pair* of nerves consist of two portions, the *par vagum* and the *glosso-pharyngeus*, which last is distributed to the fauces and tongue.

134. The *par vagum* passes through the neck, thorax, and diaphragm to the stomach.

135. In the neck it gives off several branches in its course; in the thorax it gives off the *recurrent laryngeal branch*, which is distributed to the *trachea œsophagus* and *larynx*.

136. In its course in the thorax it has communications with the *great sympathetic*, and gives off branches to form the *anterior* and *posterior pulmonary plexuses*, which supply the lungs; the *greater* and *lesser œsophageal plexuses*, which supply the *œsophagus*.

137. The *absorbents* of the lungs all pass into the *bronchial glands*, which are of a dark colour, and are situated before and behind the bifurcation of the *trachea*.

138. The *anterior mediastinum* contains a few glands and the remains of the *thymus gland*.

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\* The remaining course of the *great sympathetic* will be seen in the description of the nerves of the abdomen.



139. But the contents of the *posterior mediastinum* are important; first, the *aorta*, on its right side the *vena azigos*, and between them the *thoracic duct*; before the *aorta* the *œsophagus* and *eighth pair of nerves*, and the *root of the trachea*.

140. The *pericardium* is a firm compact membranous bag, containing the heart, and reflected over the heart's surface.

141. Upon opening the pericardium, the heart and large vessels are seen.

142. The HEART is composed of *three coats*; the first is as stated a reflection of the pericardium; the *middle coat* is muscular, and constitutes its substance; the third, or *internal coat*, is smooth, and a continuation of the membrane lining the great vessels.

143. The *primitive vessels* are the *two venæ cavæ*, the *pulmonary artery*, the *four pulmonary veins*, and *aorta*.

144. The upper part of the heart is, expanded and fixed, called its *base*; the lower part is, contracted and loose, called its *apex*; and the part between is called its *body*.

145. There are *four cavities* in the heart; two called *auricles*, in its base; and two called *ventricles*, in its body.

146. On opening the *venæ cavæ* we see two openings, one from each cava; and between them a thickening of the parietes of the vessel called the *tuberculum Loweri*.

147. Between the auricles there is a partition, called the *septum auriculorum*; and on it there is an oval depression; which in the fœtus is an opening called the *foramen ovale*.

148. At the termination of the inferior cava, there is a duplicature of the inner coat of the right auricle, called the *valvula nobilis Eustachii*.

149. On the internal surface of the auricle, there are some muscular bands which are called the *musculi pectinati*.

150. Between the right auricle and the cavity beneath it, called the right ventricle, there is an opening called the *ostium venosum*.

151. Having opened the right ventricle, some muscular bundles of fibres are seen arising from the edge of the ostium venosum, and projecting into the ventricle.

152. These muscular fibres form a complete circle

around the ostium venosum, where they arise ; but their edge which projects into the ventricle, is divided into *three parts*, called the *tricuspid valves*.

153. These valves are attached by small tendinous bands, called *chordæ tendinæ*, to muscular processes of the ventricle called *carneæ columnæ*.

154. The *septum ventriculorum* is a partition between the two ventricles, marked externally by the course of two veins running from the base to the apex of the heart.

155. The *pulmonary artery* arises from the back part of the right ventricle ; and the opening from the ventricle to the artery, is called the *ostium arteriosum*.

156. At the beginning of the pulmonary artery there are *three semilunar valves* arising from the sides of the artery.

157. At the loose edge of each there is a small white body, called the *corpus sesamoideum*.

158. Passing from the pulmonary artery to the aorta, is a ligament which, in the fœtus, is a vessel called the *ductus arteriosus*.

159. The *left auricle* has the *four pulmonary veins* entering it ; and it differs from the right in being somewhat smaller, and having its muscular coat thicker.

160. From it, as from the right, there is an opening leading into the ventricle beneath it, called the *ostium venosum*.

161. The *left ventricle* is much thicker, and somewhat smaller than the right.

162. Arising from the ostium venosum of the left auricle, a process is seen projecting into the ventricle similar to that on the right side, but differing from it in its edge, having but *two* divisions ; consequently they are called the *bicuspid* or *mitral valves* ; but they are attached in the same manner by *chordæ tendinæ* to the muscular columns of the ventricle.

163. From the upper and back part of the left ventricle the *aorta* arises ; and at the beginning of it there are *three semilunar valves*, like those of the pulmonary artery ; and having a small white body at the edge of each, called the *corpus sesamoideum*.

164. Behind these valves the artery bulges out, and forms what are called the *sinuses* of the aorta.

165. The *nutrient arteries* of the heart are *two*, called the *coronary*; they arise above two of the valves of the aorta—one supplies the right and one the left side of the heart.

166. The *veins* returning the blood from the substance of the heart unite and form the *great coronary vein* on the fore part of the heart; and it finally terminates in the right auricle behind the Eustachian valve.

167. The *nerves of the heart* are derived from the *cardiac plexus*, which is situated behind the arch of the aorta, and is formed by branches from the *three first ganglia* of the *great sympathetic*, from the *eighth pair* and *recurrent laryngeal*.

168. The *absorbents of the heart* are received by the *cardiac glands*, situated at the arch of the aorta; and these send branches which terminate in the thoracic duct.

169. DIAPHRAGM.—The diaphragm is placed between the chest and abdomen; convex above, and concave below.

170. It is covered by the pleura and pericardium above, and by the peritoneum below.

171. It is composed of a *greater* and *lesser muscle*, and of a *cordiform tendon* in the centre.

172. The *greater muscle* arises from the sternum and the ends of the last ribs on each side, the fibres pass in a radiated direction, and are inserted into the cordiform tendon.

173. The *lesser muscle* arises on each side by slips from the second, third, and fourth lumbar vertebrae; which unite and form what is called a *crus* on each side; and these decussate and then separate, and are inserted into the cordiform tendon.

174. There is an opening between the crura before they decussate, through which the *aorta* and *thoracic duct* pass.

175. There is another opening between the crura after they have decussated, which transmits the *œsophagus* and *eighth pair* of nerves.

176. Towards the right side there is a triangular opening in the central tendon, which transmits the *vena cava*.

177. The *great sympathetic* and *splanchnic nerves* on

each side pass through small openings between the fibres of the crura.



## VISCERA OF THE ABDOMEN.

178. The external part of the abdomen is nominally divided into *three regions*; each of which is subdivided.

179. The upper part includes the parts covered at the sides by the lower ribs, and is called the *epigastric* region, and its lateral portions the *right* and *left hypochondriac* regions.

180. The *second* or *umbilical* region extends from the epigastric to a line drawn between the anterior superior spinous processes of the ilia, and its lateral portions are called the *lumbar regions*.

181. The lower or *hypogastric* region begins at the termination of the last, and comprehends the remaining part; it is subdivided into the *pubic* region in the middle, and the *inguinal* regions on each side.

182. The abdomen is bounded superiorly by the diaphragm; inferiorly by the bones of the pubes and ischium; anteriorly by the abdominal muscles; posteriorly by the lumbar vertebrae, os sacrum and os coccygis.

183. The whole internal part of the abdomen is lined with a serous membrane, called the *peritoneum*, which also gives a covering to most of the viscera.

184. The principal viscera of the abdomen on the fore part and sides; are the *stomach*, the *large* and *small intestines*, the *pancreas*, and the *liver* with its gall bladder; these all receive a peritoneal covering.

185. Posteriorly are the *kidneys*, with their ducts, the *receptaculum chyli*, the *descending aorta*, and the *ascending vena cava*; and these do not receive a covering from the peritoneum, it merely runs before them.

186. Inferiorly in the pelvis are the *urinary bladder* and the *intestinum rectum*.

187. In the female there are, in addition, the *uterus* with its *appendages* and the *vagina*.

188. These are all *partially* covered by *peritoneum*.

189. THE PERITONEUM.—Tracing it from where it lines the abdominal muscles, it covers the fundus and back part of

the bladder; it then covers the rectum and lines the pelvis, and then passes to the lumbar vertebræ; thence it passes over all the small intestines and descends again to the lumbar vertebræ; thus forming a duplicature called the *mesentery*.—It then forms the *posterior* layer of the *mesocolon*; the anterior is derived from another portion presently to be described. These layers pass over the colon, and again unite and descend in front of the small intestines; they then double upon themselves and ascend, and these four layers are called the *great omentum*. The two layers pass upwards to the great curvature of the stomach, where they separate and enclose the stomach, and uniting at the little curvature, they pass to the inferior surface of the liver; this process is called the *little omentum*. At the liver the two layers separate; the *anterior* layer is reflected over the concave, then over the convex surface of the liver; it then lines the under surface of the diaphragm, and thence it goes to line the abdominal muscles where the description began. The *posterior* layer descends covering the spine, and forms the *anterior layer* of the *mesocolon*.

190. In the female the peritoneum covers part of the vagina and a great portion of the uterus, forming its broad ligaments.

191. On opening the abdomen, the parts brought into view are the *stomach* on the *left* side; the *liver* on the *right* side; on the *fore part* the *great omentum*; and some *convolutions* of the *small intestines*.

192. The *structure* of the stomach and intestinal canal throughout, consists of, *first*, a *peritoneal coat*; *second*, a muscular coat, consisting of *circular* and *longitudinal fibres*; and *internally* a mucous coat connected to the muscular by a small portion of cellular membrane, containing numerous glands.

193. The mucous coat lining the intestinal canal is much more extensive than the other coats; consequently, it is corrugated more or less in different parts.—In the stomach these folds are called *rugæ*; in the intestines, *valvulæ conniventes*, which are much more numerous in the small than the large intestines.

194. The *STOMACH* is a large conical bag, situated in the left hypochondriac and a part of the epigastric regions.

195. It is connected above to the œsophagus, below to the duodenum; and by the great and little omentum to the liver diaphragm and colon; and to the spleen by a reflection of the peritoneum.

196. It has *two curvatures*; the *great* one facing somewhat downwards towards the left side; the *little* one somewhat upwards and forwards to the right side.

197. The *upper* orifice where the œsophagus enters is called the *cardia*; the lower where the duodenum commences the *pylorus*.

198. The *pylorus* is formed by a fold of the mucous membrane, containing some muscular fibres and projecting into the interior of the stomach.

199. The INTESTINES form one continuous tube, five or six times the length of the body, from the *pylorus* to the *anus*.

200. They are divided into *small* and *large* intestines, differing in their figure and functions.

201. The *small* intestines are divided into *duodenum*, *jejunum*, and *ilium*; the *large* into *cæcum colon* and *rectum*.

202. SMALL INTESTINES.—The *duodenum*, or first division of the small intestines, is not more than nine or ten inches in length, and is broader than any other portion of the small intestines.

203. Beginning from the pylorus, it turns upwards to the right side under the liver, and then turning upon itself it descends as low as the right kidney; and here it receives the *pancreatic* and *gall* ducts, and it terminates under the root of the mesocolon.

204. The *jejunum* and *ilium* are about four times the length of the body.

205. The *jejunum* begins at the termination of the duodenum, and constitutes about *two fifths* of the canal which extends from the termination of the duodenum to the beginning of the large intestines.

206. It has a great number of folds of the mucous or internal coat, which are called *valvule conniventes*.

207. The *ilium* constitutes the remaining *three fifths* of the canal; it terminates in the beginning of the large intestines; and the *valvule conniventes* are less numerous in it than in the jejunum.

208. The convolutions of the *jejunum* and *ilium* occupy the *umbilical* and *hypogastric* regions; beginning from the duodenum in the *left lumbar* region, they terminate in the *right inguinal*.

209. GREAT INTESTINES.—The *cæcum* is placed at the beginning of the large intestines; it is merely a blind pouch, about three or four inches in length.

210. Upon the back part of the *cæcum* there is a little appendage, called the *appendix cæci vermiformis*.

211. The *colon* commences from the *cæcum* and ascends on the right side towards the liver; and this is called its *ascending portion*: it then passes across the abdomen, under the stomach to the left side, and this portion is called its *transverse arch*; it then passes down on the left side into the pelvis, which is called the *descending portion*; and here it becomes contorted like the letter S, which is called its sigmoid flexure, and terminates at the top of the sacrum in the *rectum*.

212. The *colon* constitutes nearly all the canal which is called the great intestines.

213. The peculiarities of the *colon* are its *longitudinal muscular bands*, which contract the tube up into cells internally; and on the surface of this intestine there are some fatty projections, called *appendicæ epiploicæ*.

214. The *Rectum* begins at the top of the sacrum, and is continued over the anterior surface of the sacrum and os coccygis to the anus.

215. The intestines are chiefly connected to the body by the mesentery.

216. Placed between the large and small intestines, there is a peculiar structure, called the *ilio-colic valve*.

217. This is formed by two folds of the mucous membrane of the small intestine, containing some muscular fibres; one fold is towards the *cæcum* and one towards the *colon*; and between these is the opening from the small to the large intestines.

218. LIVER.—The liver is situated chiefly in the right *hypochondriac* region, and retained there by *five* ligaments, four of which are formed by the peritoneum, and the *ligamentum teres* by the remains of the umbilical vein.

219. The *first* is the *ligamentum teres*, which is contained in the duplicature of



220. The *second*, which is on the convex surface of the liver is called the *ligamentum suspensorium*.

221. The *third* ligament is the *coronary*, which connects the convex surface of the liver to the diaphragm.

222. From this a ligament goes off on each side, and these are called the *broad ligaments*.

223. The upper surface of the liver is convex, corresponding to the diaphragm, and concave below; it is very thick where it lies against the spine posteriorly, called the *margo obtusis*; and very thin anteriorly, which is called the *margo acutis*.

224. The liver is divided by the *fossa umbilicalis* into two lobes; the *right* or larger, and the *left* or smaller.

225. The *greater* lobe has *three* projections; *first*, the *lobulus Spigelii* between the two lobes, but attached to the right; and *second*, this has a projection called the *lobulus caudatus*; and *lastly*, there is the *lobulus quadratus*, situated between the umbilical fissure and the gall bladder.

226. The *sulci* of the liver are, first the *umbilical fissure* dividing the two greater lobes, with a few fibres crossing it, called *jons hepatis*; next the continuation of this fissure along the right lobe, called the *fossa ductus venosi*; the next fissure is for the *vena cava ascendens*, called the *longitudinal*; then there is the *transverse fissure*, where the vessels enter the liver; and lastly, the *sulcus* for the gall bladder.

227. Thus there are *five ligaments*, *five lobes*, *five fossa*, and next there are *five different kinds* of vessels—the *hepatic artery*, the *vena portæ*, the *venæ cavæ hepaticæ*, the *biliary ducts*, and the *absorbents*.

228. These vessels before they enter the liver are placed between the layers of the right edge of the little omentum, called *Glisson's capsule*; on the left side the *hepatic artery*; on the right side the *hepatic* and *cystic* ducts and the *common duct* formed by them; and between and behind these the *vena porta*, the *hepatic plexus of nerves*, and a few *absorbent glands*.

229. The *substance* of the liver is composed of the different vessels united together, by a loose cellular structure called *parenchyma*.

230. There are some small bodies observed in it,



called *acini*, which are supposed to be the convoluted extremities of the *vena porta*. From these the hepatic ducts, called at their commencement *pori biliarii* begin, and they are eventually gathered together into two ducts, one from the right and one from the left lobe, which unite and form the *ductus hepaticus*.

231. The *gall bladder* is situated in a depression on the under surface of the right lobe of the liver.

232. It has a partial peritoneal coat, it being deficient on that side in contact with the liver; it has also a *muscular coat* and a *mucous coat*, more extensive than the muscular, consequently gathered into folds.

233. It sends off a duct called the *ductus cysticus*, which uniting with the ductus hepaticus, forms the *ductus communis choledochus*.

234. SPLEEN.—The spleen is situated in the *left hypochondriac region*, superiorly touching the diaphragm, inferiorly the left kidney.

235. It is of an oval figure; its external surface is convex; its internal irregularly concave; and divided by a longitudinal fissure, into which its vessels enter.

236. It is of a *purple* colour, and composed of blood-vessels, nerves and absorbents connected together by a cellular structure.

237. It receives a covering from the peritoneum, and has no duct whatever.

238. PANCREAS. The pancreas is situated in the epigastric region, extending from the fissure of the spleen somewhat behind the stomach to the circle formed by the duodenum.

239. Its structure consists of *bloodvessels*, a few *nerves* and *absorbents*; its *duct* running along its middle, and a great number of *glands* connected together by a coat of cellular membrane.

240. It is covered *anteriorly* by the peritoneum; and its duct terminates in the duodenum, separately or in common with the ductus communis choledochus.

241. KIDNEYS.—The kidneys are two glandular bodies, situated in the lumbar regions; the right under the edge of the liver; the left under the spleen.

242. The right kidney is somewhat lower than the left, in consequence of the descent of the liver.

243. The upper and outer surface of the kidney is convex ; the side next the spine concave.

244. It has a *partial* peritoneal coat, under which there is a fatty matter, called *tunica adiposa* ; then a condensation of cellular membrane on its surface, called *tunica propria*.

245. The *renal artery vein* and the *ureter* enter the concavity of the kidney ; the vein in front next the artery, and behind them both the ureter.

246. The external part of the kidney is very vascular, and called its *cortical part*.

247. The internal part is called its *medullary part*, and is not near so vascular.

248. Some of the branches of the *renal artery* terminate in branches of the *renal* or *emulgent* veins ; and some in small membranous canals, called *tubuli uriniferi*.

249. The *tubuli uriniferi* converge together into twelve or fourteen small ends, called *mammary processes*.

250. Each of these processes is surrounded by a membranous funnel, which are called *infundibuli*.

251. The *infundibuli* uniting form a small cavity, called the *pelvis* of the kidney ; and this contracting forms the *ureter*.

252. The *ureter* is composed of a few muscular fibres and a mucous coat ; beginning from the *pelvis* of the kidney it passes downwards and inwards over the *psore* muscles behind the peritonæum ; it then passes between the rectum and bladder—it enters it by a valvular termination.

253. BLADDER.—The bladder is situated in the *pelvis* behind the *ossa pubis*, in front of the rectum in the male, of the uterus in the female.

254. It is a membranous pouch of an oval form, capable of distention and contraction, divided nominally into *fundus* above, *body* in the middle, and *cervix* at the lower part, from which the urethra proceeds, and where there is a small body called the prostate gland.

255. Its coats are a *partial peritoneal coat*, covering its upper posterior and lateral parts ; the next is a *muscular coat*, and the last or internal is a *mucous coat*.

256. There are *three openings* into the bladder, one from each *ureter*, by which the urine enters, and one into the urethra by which it goes out.

257. UTERUS.—The uterus is placed obliquely in the pelvis behind the bladder and in front of the rectum.

258. It is about *three inches* in length and *two inches* in breadth, and is nominally divided, like the bladder, into *fundus body* and *cervix*, which last projects into the vagina.

259. The cavity of the uterus is *triangular*, and it has *three openings* in it ; one from the *Fallopian tube* of each side at its angles ; and one at the *cervix*.

260. Its *coats* are, first a complete *peritoneal coat* except at its *cervix* ; under this there is a very thick *fibrous coat* forming its substance, and this is lined internally by a *mucous coat*, which is corrugated at the *cervix*.

261. It is retained in its situation by a ligament on each side, called the *broad ligaments*, and by the *round ligaments*.

262. The *broad ligament* on each side is merely a duplicature of the peritoneum reflected from the sides of the uterus to the sides of the pelvis.

263. In this fold is contained the *Fallopian tubes*, the *ovaria*, and the *round ligaments*.

264. The *ovaria* are *two* flattened oval bodies, one on each side, situated in the ligament just below the Fallopian tubes.

265. In their structure there are several vesicles, called the *vesicles of De Graaf*, united together by cellular membrane.

266. They are covered by a coat of condensed cellular membrane, in addition to the peritoneal coat.

267. The *Fallopian tubes* proceed from the orifices at the angles of the uterus, about *three inches* in length, and terminate in fringed extremities, which perforate the peritoneum ; and this is the only instance of the peritoneum being perforated.

268. The *round ligaments* are fibrous cords, which begin from the sides of the uterus, just below the Fallopian tubes ; they pass downwards through the abdominal ring on each side, and terminate in the fat about the mons veneris.

269. ARTERIES OF THE VISCERA OF THE ABDOMEN AND PELVIS.—The aorta having passed through the crura

of the diaphragm, gives off a small branch on each side to it, called the *phrenic* arteries.

270. It then gives off a *single* branch, called the *cæliac*; then another *single* trunk, called the *superior mesenteric*; then a *pair*, called the *renal*; then another *pair*, called the *spermatic*; then a *single* branch, called the *inferior mesenteric*; then the lumbar arteries on each side; and lastly the *arteria sacra media*.

271. At the fourth lumbar vertebra the aorta divides into the two *iliac* arteries.

272. Each *iliac* artery divides into two; the *external* and *internal iliac* artery,

273. The *external iliac* of each side runs out of the abdomen under Poupart's ligament to supply the lower extremities,

274. The *internal iliac* gives off the *umbilical*, in the female the *uterine* and *vaginal*, the *vesicalis ima*, the *middle hæmorrhoidal*, the *ilio-lumbar*, and *sacro-laterales* to the pelvic viscera,

275. It sends off several branches, which pass out of the pelvis; one of which, the *internal pudic* gives a branch to the rectum.

276. The *cæliac* artery is very short; and it divides into the *coronary* to the *stomach*; the *splenic* to the *spleen*; and the *hepatic* to the *liver*.

277. The *coronary* artery is chiefly distributed to the lesser curvature of the stomach and to the cardiac end.

278. The *hepatic artery* first gives off a branch to the right side of the great curvature of the stomach, called *gastrica inferiora dextra*.

279. The *second* branch is the *arteria pylorica*, which is distributed to the lesser curvature and pyloric end of the stomach.

280. It next sends off some branches to the duodenum, called *rami duodinales*.

281. It then divides into the *right* and *left* hepatic branches to the right and left lobes of the liver.

282. The *right* branch of the hepatic artery gives off a small branch, called the *cystic* artery, which divides into two, called *gemelli*, to the gall bladder.

283. The *splenic* artery first gives off some branches to the pancreas, called *rami pancreatici*.

284. The next branch sent off by the splenic, is the *gastrica inferiora sinistra*, which runs along the left side, of the great curvature of the stomach.

285. The next branches are the *vasa brevia*, to the cardiac end of the stomach.

286. It then enters the longitudinal fissure of the spleen, and ramifies throughout its structure.

287. The *superior mesenteric artery* forms an arch; the *concavity* towards the *right* side; the *convexity* towards the *left*.

288. *Twelve* or *fourteen* considerable branches are given off on the convex side, which are distributed to the small intestines

289. From the *convex* side *three* branches are given off; first the *ilio-colic*, next the *colica dextra*, and lastly the *colica media*.

290. The *ilio-colic* is distributed to the lower part of the ilium, the cæcum and beginning of the colon.

291. The *colica dextra* supplies the right side, and the *colica media* the right side and transverse arch of the *colon*.

292. The *inferior mesenteric*, first sends off a branch called the *ascending*, which supplies the left side of the arch of the colon.

293. The next branch is called the *colica sinistra*, which is distributed to the left side of the colon and sigmoid flexure.

294. The continuation of the trunk is called the *internal hæmorrhoidal*, and is distributed to the back part of the rectum.

295. The branches of the *mesenteric arteries* have a peculiar course; the straight branches first sent off, unite and form arches; from these other straight branches go off; which form secondary arches; thus in their course to the intestines, three or four arches are often formed from the the last of which straight branches are given off which encircle the intestine.

296. The *middle sacral* artery comes off from the aorta at the bifurcation, and sends branches to the sacrum and rectum.

297. The *four single* branches from the aorta, viz. the *celiac*, the *superior* and *inferior*, *mesenteric*, and the *middle sacral*, have now been spoken of; those which come off in pairs are now to be described.

298. The *renal arteries* pass outward; the right being the longest, as the aorta lies on the left side; they enter into the concavity of the kidney of each side.

299. The *spermatic arteries* pass downwards and outwards in the male, through the inguinal canal, with a cord to the testicle; in the female, to the upper part of the uterus, and along the broad ligaments to the ovaries.

300. The *lumbar arteries* consist of four or five pairs, and are distributed to the sacrum and muscles about the loins.

*Those branches to the pelvic viscera, from the internal iliac artery.*

301. The *umbilical artery* is very large in the fœtus, being continued from the bladder to the navel; but in the adult it extends no further than the fundus of the bladder, which it supplies; the remaining part extending to the navel, becoming a fibrous cord.

302. In the female there is in addition, a branch to the lower part of the uterus, called the *uterine*; and a small branch to the lower part of the vagina, called the *vaginal*.

303. The *vesiculis ima* is distributed to the lower part of the bladder; the prostate gland and vesiculæ seminales; in the female, to the vagina.

304. The *middle hæmorrhoidal* is distributed to the sides of the rectum, communicating with the branches supplying it from other arteries.

305. The *ilio-lumbar* is distributed to the psoæ, iliacus internus, and quadratus lumborum muscles.

306. The *sacro-laterales* are distributed to the rectum and termination of the spinal marrow.

307. The *internal pudic* artery passes out of the pelvis, and re-enters it, where it gives off the *external hæmorrhoidal* branch to the rectum, and then is distributed to the external parts of generation.

308. The arteries supplying most of the viscera, run in duplicatures of the peritoneum.

309. The different parts of the peritoneum are supplied by the neighbouring branches; thus the great omentum is chiefly supplied by the arteries running along the great curvature of the stomach; the little omentum, by those running along the little curvature; the mesentery and mesocolon,



by arteries running in the duplicature, forming them to the small intestines and colon.

310. From the foregoing description it will be seen, that the arteries supplying the *stomach* are *two* along its *small curvature*, the *coronary* and *pyloric*; along the *great curvature*, the *gastrica dextra* and *sinistra*, and the *vasa brevia* to the cardiac end.

311. It will be also seen, that the rectum is supplied by a *single* artery called the *internal hæmorrhoidal* and *two pairs*; one pair from the *internal iliac* arteries, called the *middle hæmorrhoidal*; the other pair, from the *internal pudic* arteries called the *external hæmorrhoidal*; also several minor branches from arteries near it.

312. VEINS.—The veins correspond to the distribution of the arteries; thus the *internal iliac* vein receives the branches from the pelvic viscera, parts of generation, &c.

313. The *internal iliac* vein of each side uniting with the *external iliacs*, which receive the blood from the lower extremities, forms the common *iliacs*, which unite and form the *vena cava ascendens*, running on the right side of the aorta.

314. The *vena cava* receives the blood from the *spermatic* and *emulgent* or *renal* veins, which enter it directly, except the *left spermatic* which terminates in the *left renal*.

315. The veins corresponding with the branches of the superior and inferior mesenteric arteries, and of the *cœliac* artery, except the hepatic branch, form one large trunk called the *vena portæ*, which enters the liver and ramifies through it like an artery.

316. The blood circulated through the liver by the *vena portæ* and *hepatic* artery, is returned by the *venæ cavae hepaticæ* into the *vena cava*, which receives also the *phrenic veins* from the diaphragm, which it perforates, and terminates in the right auricle of the heart, with the superior *vena cava*.

317. NERVES.—The nerves supplying the abdominal viscera, are the *par vagum*, and *splanchnic* nerve from the sympathetic.

318. The *par vagum* on each side, after having supplied the lungs and *œsophagus*, unite and perforate the diaphragm, and are distributed chiefly to the stomach, but communicating with the *splanchnic* nerves from the great sympathetic.

319. From the *sixth, seventh, eighth, ninth, and tenth* dorsal ganglia of the great sympathetic, two nerves arise from each, called the *splanchnic*, which perforate the diaphragm; when the nerves of each side unite and supply the remaining viscera of the abdomen.

320. This nerve forms the *semilunar ganglion*, at the root of the *cœliac*, artery, which sends off branches which form the *cœliac plexus*.

321. The *cœliac plexus* gives off branches which form two large *plexuses*, called the *aortic* and *solar*.

322. The *solar plexus* gives off *four minor plexuses*; the *hepatic* to the liver, the *splenic* to the spleen, the *superior mesenteric* to the small intestines, and the *renal* to the kidneys.

323. The *aortic plexus* runs down close to the *aorta*, and forms the *inferior mesenteric*, which sends off branches distributed with the artery to the large intestines.

324. The next plexus from the *aortic*, is the *hypogastric* to the pelvic viscera.

325. The *spermatic plexus* is formed partly by the renal and partly by the hypogastric, and is distributed with the artery.

326. The *great sympathetic* having passed through the diaphragm and entered the abdomen, forms *five lumbar* and *five sacral ganglia*.

327. On the *os coccygis*, the nerve on each side unites and forms the *ganglion impar*; and all these ganglia communicate with the nerves in their vicinity.

328. GLANDS AND ABSORBENTS.—The *absorbents* of the intestines are called *lacteals*, which are more numerous in the small than in the large intestines, particularly in the *jejunum*.

329. The *lacteals* and *absorbents* from the *stomach, intestines, spleen, and pancreas*, pass to the *glands* in the *mesentery* and *mesocolon*; those from the *liver*, to some *glands*, in *Glissons capsule*, and the *arterial mediastinum*; those from the *kidneys* and *testicles*, in the *lumbar glands*.

330. All these glands send branches which eventually terminate in the *thoracic duct*.

331. THORACIC DUCT.—This is the great trunk of the absorbents, and it begins to be formed by the absorbents from the lower extremities, and from those of the pelvis



near the common iliac vein on each side, it runs along the lumbar vertebræ, and receives the lacteal vessels ; and where they enter, it is slightly dilated, which is called the *receptaculum chyli*.

332. It then passes through the diaphragm with the aorta, and in the thorax it runs between it and the vena azigos, and it terminates by entering the angle between the left subclavian and jugular veins.

333. It receives the absorbents from every part of the body, with the exception of all those from the right side above the diaphragm, which form a small duct which enters at the same point on the right side.



## OF THE PARTS CONNECTED WITH THE FOETAL CIRCULATION.

334. First, a vein called the *umbilical* goes off from the placenta of the mother, and enters the navel of the *fœtus*, and then in part ramifies through the liver, communicating with the branches of the vena portæ.

335. Second, this vein sends off a large branch called the *ductus venosus*, which does not ramify through the liver, but passes between the right and left lobes of the liver, and enters the vena cava.

336. Third, there is a communication between the right and left auricle, by an opening called the *foramen ovale*.

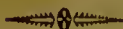
337. Fourth, there is a branch passing from the middle of the pulmonic artery, which enters the aorta just below its arch, called the *ductus arteriosus*.

338. Fifth, The *two umbilical arteries* which come off from the internal iliaes, pass upwards to the navel, and through it to the placenta of the mother.

339. The *umbilical vein* and the *two umbilical arteries*, between the placenta of the mother and the navel of the *fœtus*, are contained in a sheath with some cellular substance, and this takes the name of the *funiculus* or umbilical cord.



## PHYSIOLOGY.



1. Whilst Anatomy treats of the structure of the body, Physiology treats of its powers and actions.

### OF THE BRAIN AND NERVOUS SYSTEM.

2. The brain is the most remote source to which we can trace the functions of the human body. We know from experiments, that if the nerves, which are mere prolongations of the brain, going to any part are divided, that part has no longer any power to perform its office; thus every part of the body is dependant on the brain for the performance of its function. Although every part of the body derives its power of action from the brain, yet it is dependant in its turn on the vascular system; as, if it does not receive its due quantity of blood, it performs its office imperfectly or not at all. Yet as the heart could not have begun to contract if it had not been supplied with nerves, so the brain must be considered the ultimate structure to which we can trace the actions of the body.

3. As the various parts of the body are dependant on the brain, so it may be inferred, though not demonstrated, that the brain depends on some *immaterial principle*, which not only gives it power to regulate the motions of the body, but enables it to arrange, compare and combine the various impressious made on the senses, and which has been termed the *intellectual power*.

4. The *immaterial principle* may therefore be compared in its action on the body, to the action of any human power in putting in motion a piece of mechanism; and the brain may be said to correspond to the principal part, or that upon which the actions of the other parts depend.

5. Of the *great sympathetic nerve* it may be observed, that it is distributed to the parts that are not under the controul of the will; thus, for example, the liver goes on secreting the bile, the stomach digesting the food, without the will being at all concerned; whilst most other parts, which are not supplied by branches from this nerve, are controuled by the will; thus, we may or may not, as we choose, exert the various muscles moving the body.

### OF THE EYE.

6. The *muscles* of the eye are for turning the globe in various directions, according to the direction of the object to be viewed; thus one *rectus* muscle draws it upwards, and another downwards; one inwards, and another outwards; one of the oblique muscles draws it upwards and inwards, the other downwards and outwards; if the four *recti* act at the same time, they draw it within the orbit; if the two *obliqui*, they protrude it.

7. The *eyelids* are for closing the eye, and diffusing the tears over the fore part of the globe; the *eyelashes*, to prevent foreign bodies from entering the eye when open.

8. The *lacrymal gland* is supposed to secrete only the salt tears, or those occasioned by passions of the mind.

9. The common tears lubricating the globe are supposed to be secreted by the small *glands* around the eyelids, called *Meibomian*, the *tunica conjunctiva*, and the *caruncula lacrymalis*.

10. These tears or more properly this secretion, and the salt tears when secreted are transmitted through the *puncta lacrymalia*, *lacrymal sac*, and *nasal duct*, into the nose.

11. The *cornea* is for collecting the rays of light; the *iris* for regulating the quantity of light entering the eye; the *choroid coat* for absorbing the superabundant rays of light; and the *retina* for receiving the impression of the object, and to transmit it to the brain.

12. The *aqueous humour* is for distending the cornea, and giving free motion to the iris; the *vitreous humour* to preserve the globe of the eye in its proper form; and the *crystalline lens* to converge the rays of light and concentrate them on the retina.\*

13. PARTS ABOUT THE FAUCES.—*Deglutition*.—The dorsum of the tongue is rendered concave, to receive the bolus of food; then it recedes towards the pharynx and becomes convex, by which the food is thrown off the tongue into the pharynx. It is embraced by the constrictor, muscles of the pharynx and prevented returning into the mouth by the velum and tongue and pillars of the fauces approximating—into the nostrils by the velum and pharynx; and it is prevented entering the windpipe by the epiglottis; it therefore passes into the œsophagus, and by the contraction of its muscular fibres it is carried into the stomach.

14. The *tonsil glands* pour out a secretion for lubricating the passage of the fauces, by which the passage of food is facilitated.

15. VISCERA OF THE THORAX.—LUNGS.—*Respiration* consists of *inspiration* and *expiration*; and it is effected by a simultaneous action of the diaphragm and lungs.

16. In *inspiration*, so soon as the air begins to enter the lungs, the diaphragm descends, pressing on the viscera of the abdomen, and enlarging the cavity of the thorax.

17. In *expiration*, so soon as the air begins to quit the lungs, the abdominal muscles pressing on the abdominal viscera cause them to force up the diaphragm, and thus contract the cavity of the thorax.

#### *Changes produced on the blood by respiration.*

18. The atmospheric air consists of oxygen and nitrogen, and is inhaled through the mouth, larynx and trachea into the air cells of the lungs.

19. The blood returned from every part of the body by the veins is of a dark colour, from containing a quantity of carbon, and is circulated through the lungs by the pul-

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\* The physiology of vision cannot be explained without entering into the principles of optics; which would take too much space, and be foreign to the design of this book.

monary artery ; the minute branches of which ramify in the air cells ; and here the air coming in contact with it, there being merely a thin membrane intervening, the oxygen unites with the carbon, and forms with it *carbonic acid gas* ; and this, with the nitrogen, is expired, leaving the blood of a red colour.

20. Thus it will be seen, that the principal office of the lungs is to purify the blood ; and also, by expelling the air through the windpipe, they produce the voice.

21. HEART.—The heart receives the blood from every part of the body, and distributes it to every part.

22. The *tricuspid valves* prevent the blood, received from the right auricle, from returning into it when the right ventricle contracts.

23. The *semilunar valves*, at the root of the pulmonary artery, prevent the blood from returning into the right ventricle when it is empty.

24. The *bicuspid valves* prevent the blood from returning into the left auricle when the left ventricle contracts.

25. The *semilunar valves*, at the root of the aorta, prevent the blood from returning into the left ventricle when it is empty.

26. CIRCULATION OF THE BLOOD.—The blood is returned from every part of the body by the two *venæ cavæ*, and emptied into the right auricle of the heart, which contracting it is propelled into the right ventricle ; and by its contraction into the pulmonary artery ; and by its branches into the air cells of the lungs. After being purified in the lungs, it is returned from them by the four pulmonary veins ; two from each lung into the left auricle of the heart ; thence by its contraction into the left ventricle ; which contracts and propels it into the aorta ; through which it passes into numerous branches to every part of the body ; from which it is again returned by the *venæ cavæ*, again to pass through the heart and lungs.

27. VISCERA OF THE ABDOMEN.—*Peritoneum*.—It supports the viscera, contains glands in its duplicatures, is a medium for the vessels going to them, and its internal surface being very smooth and lubricated by a serous effusion, it allows the intestines freely to move on each other.

28. SECRETION is a function possessed by some structures of the body, more particularly the glands, of sepa-

rating from the blood a fluid differing more or less from it.

29. Secretion is performed in almost every part of the body; in the *serous* membranes, viz. the *plenra*, peritoneum, and pericardium, it appears to be but little more than an exhalation from the extreme branches of the arteries, differing but little from the serum of the blood.

30. The next most simple kind of secretion is by the *mucous* membranes, which line the air passages, intestinal canal, and urinary passages; and this secretion is more thick and viscid, and appears to be produced by numerous small glands placed in these membranes.

31. The other secretions of a more complicated character are performed by large glands, as the liver, pancreas and kidney.

32. LIVER.—The bile is supposed to be secreted by the acini of the liver from the extreme branches of the *vena portæ*; thence it passes into the biliary duets, which convey it into the right and left hepatic ducts; and from these it passes into the hepatic duct; then, if wanted for digestion, through the ductus communis choledochus into the duodenum; if digestion be not going on, it regurgitates through the cystic duct into the gall bladder till it is required to assist in digestion.

33. *Constituents of Bile.*—A considerable portion of water, an albuminous, a resinous, and a colouring principle caustic soda, and phosphate of lime.

34. *Uses.*—To separate the chyle from the chyme; to excite by its acridity the peristaltic motion of the intestines; to impart colour to the *fæces*; and to prevent the abundance of mucous and acidity in the small intestines.

35. PANCREAS.—This gland, or more properly congeries of glands, pours out a secretion into the duodenum, similar in its nature to saliva, which assists the bile in separating the chyle from the chyme; it is said also to dilute the cystic bile, which becomes more viscid than that poured directly from the liver.

36. DIGESTION.—The food is broken down by the teeth, and intimately mixed with the saliva; thence it passes through the pharynx and œsophagus into the stomach; here it is mixed with a secretion poured out from the mucous membrane of the stomach, called the



*gastric juice*, which reduces it to a pulpy mass, called *chyme*.

37. When the food has been properly acted on in the stomach, the pylorus dilates, and then it gets into the duodenum, and there it is mixed with the *bile* and *pancreatic juice*; and then it has a disposition to separate into two parts—probably from being mixed with them. The chyle becomes attached to the *valvulæ conniventes* of the small intestines; and it is here taken up by the lacteals which open upon them.

38. The alimentary matter having passed through the small intestines goes through the *ilio-colic valve* into the large intestines, where a *very small* portion more of chyle is supposed to be taken up; and here the mass takes the name of *fæces*, and is evacuated at the anus.

39. The use of the *ilio-colic valve* is to prevent the alimentary matter, after it has passed through it into the large intestines, from returning back into the small.

40. The *chyle* possesses the properties of the blood, and it is transmitted by the lacteals into the *mesenteric glands*; then by other lacteals into the *receptaculum chyli* and *thoracic duct*; by which it is carried to be mixed with the blood into the angle formed by the left internal jugular and subclavian veins.

41. SPLEEN.—Of the function of the spleen, it having no duct, there are various opinions: the most plausible, is that of Dr. Haighton, who thought that when the stomach is distended that it presses on the splenic artery, preventing so much blood going to the spleen; causing thereby a greater quantity to go to the stomach and liver for the purposes of digestion. An opinion has been advanced by Dr. James Johnson, that it acts as a reservoir for the superabundance of blood driven from the surface internally in some diseases—for instance, in the cold stage of intermittent fever.

42. KIDNEY.—The *urine* is supposed to be secreted from the branches of the renal artery in the cortical part of the kidney; it is transmitted through the *tubuli uriniferi*, *mamillary processes*, and *infundibuli* into the *pelvis* of the kidney, then through the *ureter* into the bladder.

43. The *urine* contains several salts, chiefly *murates* and *phosphates*, *water* the *uric acetic*, and *carbonic acids*, &c.

44. Its use is to liberate the body from superfluous water and salts.



45. **UTERUS.**—The principal functions of the uterus are *first, menstruation; secondly, conception, nutrition, and parturition* of the fœtus.

46. *Menstruation.*—There is in the female generally, from the age of *fifteen to forty-five*, a monthly periodical discharge of a fluid resembling blood. It continues two or three days, and the quantity poured out is about four or six ounces, but it ceases during pregnancy and suckling.

47. Its principal *use* appears to be to prepare the uterus for conception.

48. *Conception.*—The semen of the male is supposed to enter the uterus; and its subtile principle is believed to pass along one of the Fallopian tubes to an ovum in one of the ovaria, which it impregnates. A motion is induced in the vivified ovum, which ruptures the vesicle that contains it and the condensed cellular membrane and peritoneal coat of the ovarium, it is then grasped by the fimbriated extremity of the Fallopian tube, and conveyed through it into the uterus, there to be brought to maturity.

49. The *nutrition* of the fœtus is effected by means of blood, which it receives from the mother through the medium of a substance attached to the internal part of the uterus, called the *placenta*.

50. **FÆTAL CIRCULATION.**—The blood passes from the *umbilical vein* partly through the liver, and thus indirectly into the *vena cava*, and partly through the *ductus venosus* directly into it. The blood thus having reached the vena cava, passes into the right auricle; from which, part of it passes through the *foramen ovale* into the left auricle, and part of it into the right ventricle. From the right ventricle it enters the pulmonary artery; hence the greater part of it goes through the *ductus arteriosus* directly into the aorta; whilst the remaining small portion passes by the branches of the pulmonary artery through the lungs. It is returned from the lungs by the four pulmonary veins into the left auricle, and it passes thence, with that already received through the foramen ovale, into the left ventricle, which propels it into the aorta, and with that received through the ductus arteriosus into the system. It is returned to the mother by the umbilical arteries.

51. **BLOOD.**—It is the nutritive fluid of the body; it first builds up the body, and afterwards maintains it; and

it is the medium through which heat is distributed over the body.

52. It is diminished by the various secretions, and by nourishing the different structures of the body, and replenished by the chyle taken up from the intestines.

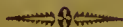
53. When separated from the body it coagulates, and afterwards spontaneously separates into two parts, one called the *serum* or fluid part, the other the *crassamentum* or solid part.

54. The *serum* may be coagulated by alcohol, the mineral acids, and oxymuriate of mercury; part of this coagulum may be rendered fluid again, and this is called *gelatin*; part of it cannot be rendered fluid again, which is called *albumen*; and a small part of it cannot be coagulated, and is called *serosity*.

55. The *crassamentum* may be separated into a fibrous structure, called *fibrin*; and some red globules, which are the heaviest part of the blood, and called the *colouring matter*, which is supposed to derive its colour from the presence of *iron*; and in the veins there is in addition, *carbon*.

56. The temperature of the blood is about 98° of Fahrenheit's thermometer.

## QUESTIONS ON ANATOMY.



1. Describe the brain and its situation.
2. How many membranes cover the brain?
3. Of how many layers is the dura mater composed?
4. What are the principal duplicatures or processes of the dura mater, and how are they formed?
5. How are the sinuses formed?
6. Which are the principal sinuses?
7. What is the course and termination of the superior longitudinal sinus?
8. Where are the two lateral sinuses situated, and where do they terminate?
9. Where is the torcular Herophili placed, and where does it terminate?
10. What kind of membrane is the tunica arachnoides?
11. How does the pia mater cover the brain, and what purpose does it serve?
12. What arrangement do we observe in the substance of the brain?
13. How is the brain generally divided by anatomists?
14. How is the cerebrum divided superiorly and inferiorly?
15. What do we observe in the formation of the brain?
16. What do we see on separating the two hemispheres?
17. What do we observe on the corpus callosum?
18. Upon cutting the hemispheres to a level with the corpus callosum what do we see?
19. What cavities are situated under the centrum ovale?

20. What separates the lateral ventricles ?
21. What is the cavity between the layers of the septum lucidum called ?
22. What do we see in the lateral ventricles ?
23. How many cornua or prolongations have the lateral ventricles, and what is seen in each ?
24. How do the lateral ventricles communicate ?
25. What is that membrane called which is placed under the fornix ?
26. What opening is placed in front of the optie thalami ?
27. What is that opening called under the velum interpositum ?
28. How many commissures are there, and where are they placed ?
29. Where is the third ventricle situated ?
30. How many passages are there leading from the third ventricle ?
31. Where are the corpora quadrigemina situated, and what names do they receive ?
32. What is that body called which lies between the nates ?
33. What proportion does the cerebellum bear to the whole brain, and what separates it from the cerebrum ?
34. What do we observe particular in its formation ?
35. How is the cerebellum divided ?
36. What prominences do we observe upon it ?
37. Where is the velum interjectum situated ?
38. What is observed on each side the velum interjectum ?
39. What peculiar arrangement do we see on making a vertical incision of the cerebellum ?
40. Where is the fourth ventricle situated ?
41. Do all the ventricles communicate with each other ?
42. What divisions do we see at the base of the brain ?
43. Where is the pons Varolii situated and how is it formed ?
44. Where does the medulla oblongata begin and terminate ?
45. How many eminences are there on the medulla oblongata and what are they called ?
46. What unites the crura cerebri ?
47. What bodies are placed before the pons Varolii ?

48. What is placed before the corpora albicantia ?
49. What do we understand by the tractus optici ?
50. What arteries supply the brain ?
51. Into what arteries do the internal carotids divide ?
52. What is the course of the anterior artery of each side ?
53. Where do the middle arteries run ?
54. What arteries do the communicating branches join ?
55. What is the course of the vertebral artery of each side, and what artery is formed by their union ?
56. Into what arteries does the basilar divide ?
57. What circle is formed by the arteries at the base of the brain ?
58. How is the circle of Willis formed ?
59. What parts are seen in the circle of Willis ?
60. How is the blood returned from the brain ?
61. Which sinuses receive the blood from every part, and in what veins do they terminate ?
62. What is the origin and distribution of the first pair of nerves ?
63. What of the second ?
64. What of the third ?
65. What of the fourth ?
66. What of the fifth ?
67. What of the sixth ?
68. What of the seventh ?
69. What of the eighth ?
70. What of the ninth ?
71. What are the principal appendages of the eye ?
72. What do we observe at the inner angle of the eye ?
73. What is the situation and name of the first coat of the eye ?
74. Which is the first proper coat of the eye, and what coat is placed in front of it ?
75. What coat lies on the inner side of the sclerotic ?
76. What coat is placed in front of the choroid, coat and what do we observe in the middle of it ?
77. What coat is placed inside the choroid, and how is it formed ?
78. Enumerate the coats of the eye ?
79. What is meant by the chambers of the eye ?
80. What are the humours of the eye ?

81. Where are the aqueous and vitreous humours situated?
82. What is the figure and situation of the crystalline lens, and by what is its edge surrounded?
83. How is the eye retained in its situation?
84. From what artery are the arteries supplying the eye derived?
85. What are its chief branches?
86. Where do the veins of the eye terminate?
87. What are the nerves supplying the eye and its appendages?
88. How is the bony palate covered and the soft palate formed?
89. What do we see in the middle of the soft palate?
90. What do we observe proceeding from the sides of the soft palate?
91. What do we observe between the arches of the fauces?
92. What are found in the fold forming the anterior arch?
93. What are found in the fold of the posterior arch?
94. Where is the pharynx situated?
95. Describe the pharynx and the openings into it?
96. What do you understand by the passage of the fauces, and how is it situated?
97. What is the course of the œsophagus?
98. What are the coats forming the œsophagus?
99. What is the larynx?
100. How many cartilages compose the larynx, and where are they situated?
101. Where is the opening into the windpipe placed?
102. Where does the trachea begin and terminate?
103. How is the trachea formed?
104. How is the thorax bounded?
105. What are the contents of the thorax?
106. What membrane covers the lungs and lines the ribs?
107. How many lungs are there, and how are they invested by the pleura?
108. How is the mediastinum formed?
109. What do we observe in the mediastinum?
110. How is the mediastinum divided?

111. What is the shape and colour of the lungs ?
112. Which lung is the largest, and how is each divided ?
113. What enters into the grooves which separate the lungs into lobes ?
114. What is that part of the lungs which is fixed to the spine called, and what enters them at that part ?
115. What is the structure of the lungs ?
116. How may the bloodvessels of the lungs be divided ?
117. What are the functional vessels ?
118. Where does the pulmonary artery arise, how is it distributed in the lungs, and how do its branches terminate ?
119. How many pulmonary veins are there, and where do they terminate ?
120. What are the nutrient arteries of the lungs called, and where do they arise from ?
121. Which is the first bronchial artery given off ?
122. Which is the second ?
123. Which is the third ?
124. How is the œsophagus supplied with blood ?
125. What arteries supply the pleura ?
126. From what parts does the vena azigos receive the returning blood ?
127. In what vein is the blood received from the other parts of the thoracic viscera ?
128. Where do the vena azigos and upper left intercostal terminate ?
129. Where are the nerves of the thoracic viscera derived from ?
130. Where and how is the great sympathetic formed ?
131. What does the nerve on each side form in the neck and thorax ?
132. What branches communicate with the ganglia of the great sympathetic ?
133. Of how many portions does the eighth pair of nerves consist, and where is the glosso-pharyngeal distributed ?
134. What is the course of the par vagum ?
135. What particular branch does it give off in the thorax, and where is it distributed ?
136. What nerve is it connected with in the thorax, and what plexuses does it form ?



137. Into what glands do the absorbents of the lungs pass, and where are they situated?
138. What are the contents of the anterior mediastinum?
139. What are the contents of the posterior mediastinum and their relative situation?
140. What kind of a membrane is the pericardium, and how does it cover the heart?
141. What do we perceive on opening the pericardium?
142. Of how many coats may the heart be said to be composed?
143. Which are the primitive vessels?
144. How is the heart nominally divided?
145. How many cavities does the heart contain?
146. What do we perceive on opening the venæ cavæ?
147. What do we observe between the two auricles, and what is placed upon it?
148. What do we observe at the termination of the inferior cava?
149. What do we perceive on the internal surface of the auricles?
150. What is the opening between the right auricle and right ventricle called?
151. What is seen upon opening the right ventricle?
152. What does the edge of the muscular fibres projecting into the ventricle form?
153. To what are the tricuspid valves attached?
154. What divides the ventricles from each other?
155. What arises from the right ventricle?
156. What are placed at the beginning of the pulmonary artery?
157. What is situated at the edge of each valve?
158. What passes from the pulmonary artery to the aorta?
159. What enters the left auricle, and in what does it differ from the right?
160. What is the opening called between the left auricle and left ventricle?
161. In what does the left ventricle differ from the right?
162. What process arises from the ostium venosum of the left side, how is its edge divided, and how are the valves formed by it attached?

163. What artery arises from the left ventricle, and what do we observe at its commencement?
164. What is meant by the sinuses of the aorta?
165. Which are the nutrient arteries of the heart?
166. What veins return the blood from the substance of the heart, and where do they terminate?
167. From what plexus are the nerves of the heart derived, and how is it formed?
168. In what glands do the absorbents of the heart terminate, and where are they situated?
169. Where is the diaphragm placed?
170. How is it covered above and below?
171. How is the diaphragm composed?
172. Where does the greater muscle arise, and where does it terminate?
173. How does the lesser muscle arise and terminate?
174. What passes through the opening between the crura before they decussate?
175. What passes through the opening between them after they decussate?
176. What other opening is there observed in the diaphragm, and what does it transmit?
177. Where do the great sympathetic and splanchnic nerves of each side pass through the diaphragm?
178. How is the external part of the abdomen nominally divided?
179. What is the extent of the upper or epigastric region, and what are its lateral portions called?
180. What is the extent of the middle or umbilical region, and what are its lateral portions called?
181. What is the extent of the lower or hypogastric region, and what are the names of its divisions?
182. How is the abdomen bounded?
183. What membrane lines the internal part of the abdomen?
184. What are the principal viscera on the fore part and sides of the abdomen?\*
185. What are placed posteriorly in the abdomen?
186. What parts are situated in the pelvis?

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\* In the text the words "the *Spleen*" have been inadvertently omitted: they should be inserted before "the *pancreas*."

187. What is there besides in the female pelvis?
188. Are the pelvic viscera covered by the peritoneum?
189. Describe the reflections of the peritoneum.
190. What parts in addition does the peritoneum cover in the female?
191. What parts are brought into view on first opening the abdomen?
192. What is the structure of the stomach and intestinal canal?
193. What is to be observed of the mucous membrane of the stomach and intestines, and what are its folds called?
194. What is the stomach, and where is it situated?
195. To what parts is the stomach connected?
196. How many curvatures has the stomach, and how are they situated?
197. What are the upper and lower orifices of the stomach called?
198. How is the pylorus formed?
199. Where do the intestines begin and terminate, and what is their length?
200. How are the intestines divided?
201. How are the small and large intestines divided?
202. What is the name of the first division of the small intestines, and what is its length?
203. Describe the course of the duodenum.
204. What is the length of the jejunum and ilium?
205. What is the extent of the jejunum?
206. How are its valvulae conniventes formed?
207. What is the extent of the ilium, and in what does it differ from the jejunum?
208. What regions do the convolutions of the jejunum and ilium occupy?
209. Where is the cœcum placed and what is its extent?
210. What do we observe on the back part of the cœcum?
211. What is the course of the colon, and into what parts is it nominally divided?
212. What portion of the great intestines does the colon constitute?
213. What are the peculiarities of the colon?
214. What is the extent and course of the rectum?

215. How are the intestines retained in their situation ?
216. What is placed between the small and large intestines ?
217. How is the ilio-colic valve formed ?
218. Where is the liver placed, and how is it retained in its situation ?
219. What is the situation of the ligamentum teres ?
220. Where is the ligamentum suspensorium placed ?
221. What parts does the coronary ligament connect ?
222. Whence do the broad ligaments arise ?
223. What is the shape of the liver, and what names do its anterior and posterior edges receive ?
224. How is the liver divided ?
225. How many projections has the great lobe ?
226. What are the names and situations of the principal sulci of the liver ?
227. How many lobes, fossa, ligaments, and different kinds of vessels are there in the liver ?
228. Where are the vessels placed before they enter the liver, and what is their relative situation ?
229. What is the structure of the liver ?
230. How are the acini and biliary ducts of the liver formed ?
231. Where is the gall bladder placed ?
232. What are the coats of the gall bladder ?
233. What is the name of the duct of the gall bladder, and with what duct does it unite ?
234. Where is the spleen situated ?
235. What is the figure of the spleen, and what do we observe on its concave surface ?
236. What is the colour and structure of the spleen ?
237. Does it receive a covering from the peritoneum, and has it any excretory duct ?
238. Where is the pancreas situated ?
239. What is the structure of the pancreas ?
240. Where does its duct terminate ?
241. Describe the kidneys and their situation.
242. Which kidney is placed lowest ?
243. What is the shape of the kidney ?
244. What are the coats of the kidney ?
245. What vessels enter the concavity of the kidney and in what order ?

246. What is observed in the structure of the external part of the kidney, and what is it called?
247. What is the internal part of the kidney called?
248. Where do the branches of the renal artery terminate?
249. How are the mammary processes of the kidney formed?
250. What surrounds the mammary processes?
251. How is the pelvis and ureter of the kidney formed?
252. What is the structure and course of the ureter?
253. Where is the bladder situated?
254. Describe the bladder and its nominal divisions?
255. What are the coats of the bladder?
256. How many openings are there into the bladder?
257. Where is the uterus situated?
258. What are the dimensions of the uterus, and how is it nominally divided?
259. Of what shape is the cavity of the uterus, and how many openings are there into it?
260. What are the coats of the uterus?
261. How is it retained in its situation?
262. How are the broad ligaments of the uterus formed?
263. What are contained in the fold forming the broad ligaments?
264. What is the figure and situation of the ovaria?
265. What is the structure of the ovaria?
266. What are their coverings?
267. Describe the Fallopian tubes?
268. Describe the course of the round ligaments.
269. Which are the first branches that the aorta gives off after passing through the diaphragm.
270. What branches are given off by the aorta in the abdomen?
271. Into what arteries does the aorta divide?
272. Into what arteries do the iliac divide?
273. Where do the external iliac arteries run, and what do they supply?
274. What branches does the internal iliac artery give to the pelvic viscera?
275. Which of the arteries that pass out of the pelvis, gives a branch to the rectum?

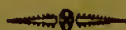
276. Into what arteries does the cœliac divide ?
277. What part of the stomach does the coronary supply ?
278. Which is the first branch that comes off from the hepatic artery, and where is it distributed ?
272. Which is the second branch from the hepatic, and what is its distribution ?
280. What other branches does it give off ?
281. Into what branches does the hepatic finally divide ?
282. What branch is given off from the right hepatic artery ?
283. Which are the first branches from the splenic artery ?
284. What is the next branch from the splenic ?
285. What are the last branches from the splenic, and what part do they supply ?
286. What is the final distribution of the splenic artery ?
287. What do we observe in the course of the superior mesenteric artery ?
288. How many branches are given off from the convex side of the superior mesenteric, and where are they distributed ?
289. What branches are given off from the concave side ?
290. Where is the ilio-colic branch distributed ?
291. Where are the colica dextra and colica media distributed ?
292. Which is the first branch from the inferior mesenteric, and what part does it supply ?
293. Which is the next branch, and what is its distribution ?
294. What is the continuation of the inferior mesenteric artery called, and what part does it supply ?
295. What is to be observed in the distribution of the mesenteric arteries.
296. Where does the middle sacral artery arise ?
297. Which are the single arteries given off from the aorta ?
298. What is the course of the renal arteries, and which is the longest ?
299. What is the course of the spermatic arteries, and where are they distributed in the male and female ?
300. How many pairs of the lumbar arteries are there, and where are they distributed ?

301. From what artery is the umbilical given off, and what is its course in the fœtus and adult?
302. What branches are given off in addition from the internal iliac in the female?
303. What is the distribution of the vesicalis ima?
304. Where is the middle hæmorrhoidal distributed?
305. What parts does the ilio-lumbar artery supply?
306. Where are the sacro-laterales distributed?
307. What branch does the internal pudic give off to the rectum?
308. Where do the arteries of the viscera run in their course to the parts they supply?
309. How are the different parts of the peritoneum supplied with blood?
310. What arteries supply the stomach?
311. How is the rectum supplied?
312. What veins return the blood from the pelvic viscera?
313. How is the vena cava ascendens formed?
314. What veins does the vena cava ascendens receive?
315. How is the vena portæ formed?
316. What veins return the blood from the liver and from the diaphragm?
317. What nerves supply the abdominal viscera?
318. What is the distribution of the par vagum on each side in the abdomen?
319. How do the splanchnic nerves arise?
320. What ganglion is formed by the splanchnic nerves, and what plexus do the branches from it form?
321. What plexuses are formed by branches from the cœliac plexus?
322. What plexuses are given off from the solar plexus?
323. Which is the first plexus given off from the aortic plexus?
324. What is the next plexus given off from the aortic plexus?
325. How is the spermatic plexus formed?
326. What does the great sympathetic form on the lumbar vertebrae and on the sacrum?
327. How does the great sympathetic on each side terminate?
328. What are the absorbents of the intestines called, and at what part are they most numerous?



329. Enumerate the different glands in which the absorbents from the different viscera of the abdomen terminate.
330. Where do the branches from the different glands terminate?
331. How is the thoracic duct formed; and what is its course in the abdomen?
332. What is its course in the thorax, and where does it terminate?
333. What absorbents does the thoracic duct receive, and where do the others terminate?
334. What is the first peculiarity in the circulation of the fœtus?
335. What is the second?
336. What is the third?
337. What is the fourth?
338. What is the fifth?
339. What enters into the formation of the umbilical cord?

# PHYSIOLOGY.



1. What do we understand by physiology ?
2. Which is the most remote source to which the functions of the body can be traced ?
3. How is the brain supposed to be dependant ?
4. To what may the immaterial principle be compared in its action on the brain ?
5. What do we observe peculiar in the distribution of the great sympathetic nerve ?
6. What are the actions of the muscles of the eye ?
7. What is the office of the eyelids and eyelashes ?
8. What is the function of the lacrymal gland ?
9. How are the common tears supposed to be secreted ?
10. What is the course of the tears ?
11. What are the several uses of the cornea, iris, choroid coat, and retina. ?
12. What are the uses of the aqueous and vitreous humours ?
13. Describe the process of deglutition.
14. What is the use of the tonsil glands ?
15. In what does respiration consist, and how is it effected ?
16. What takes place in inspiration ?
17. What takes place in expiration ?
18. Of what gases is the atmospheric air composed ?
19. Describe the change which takes place in the blood, by the air being inhaled into the air cells of the lungs.
20. What is the principal function of the lungs ?
21. What is the office of the heart ?
22. What is the action of the tricuspid valves ?
23. What is the use of the semilunar valve at the root of the pulmonary artery ?

24. How do the bicuspid valves act?
25. What is the use of the semilunar valves at the root of the aorta?
26. Describe the circulation of the blood.
27. What are the uses of the peritoneum?
28. What do we understand by secretion?
29. Which is the most simple kind of secretion?
30. Which is the next most simple kind of secretion?
31. How are the more complicated kinds of secretion performed?
32. Describe the secretion and course of the bile.
33. What are the principal constituents of bile?
34. What are the uses of the bile?
35. What kind of secretion is poured out by the pancreas, and what is its use?
36. Describe the process of digestion.
37. What change does the alimentary matter undergo in the small intestines?
38. What takes place in the large intestines?
39. What is the use of the ilio-colic valve?
40. What are the properties and course of the chyle?
41. What is the supposed function of the spleen?
42. Describe the secretion and course of the urine?
43. What are the principal constituents of urine?
44. What is the use of the urine?
45. What are the functions of the uterus?
46. What is understood by menstruation?
47. What appears to be the principal use of menstruation?
48. How is conception supposed to take place?
49. How is the nutrition of the fœtus effected?
50. Describe the fœtal circulation.
51. What is the use of the blood?
52. How is it diminished and replenished?
53. What takes place in the blood when it is separated from the body?
54. What are the properties of the serum of the blood?
55. What are the properties of the crassamentum?
56. What is the temperature of the blood?



